Proposal Reviews

#238: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

US Geological Survey

Initial Selection Panel Review	
Research and Restoration Technical Panel Review	
San Joaquin Regional Review	
External Scientific Review	#1 #2 #3 #4 #5 #6
Prior Performance/Next Phase Funding	
Environmental Compliance	
Budget	

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 238

Applicant Organization: US Geological Survey

Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**X**

Amount: **$0**

Conditions, if any, of approval (if there are no conditions, please put "None"):

none

Provide a brief explanation of your rating:

This is essentially a research/technology development proposal that uses VAMP as an opportunity to test the technique in a river with rapid changes in flows over a mobile bed. The direct value to restoration of this proposal is limited but the potential results could be very important and widely applicable to CALFED should the procedure prove workable. However, the proposers are very unclear about their own performance measures for their technology and approaches. This proposal has enough questions (both the good ratings from reviews #3 and #6, and comments from #4 bring up excellent points) to make it a very high risk proposal. Consequently, the Selection Panel recommends that this proposal not be funded.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 238

Applicant Organization: US Geological Survey

Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XSuperior	**Technical reviews were excellent = 4, good = 1; Regional = high. If successful the product would be of extremely high value.**
-Above average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   Objective is to refine existing radar-based stream-flow techniques to ultimately operate these systems in continuous near-time mode. Major hypotheses to be tested are: 1) that radar-based flow-measurement systems can be used to provide accurate flow data in timely and more frequently than conventional methods, 2) that radar-based surface-velocities are readily correlated with and can be used to predict mean-flow velocities. This would be an important innovation and a real time saver.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

The project is well designed and would extend the applicants experience with manual radar flow measurements and if successful would greatly improve stream gaging efforts during high flow conditions. In addition to the developmental efforts extensive flow velocity and channel geometry measurements would be taken to test the hypotheses.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   This project should generate novel approaches useful in river flow measurements applicable world-wide. Technical reviewers were unanimous in support of the need for this work. Product has the potential to significantly advance the ability to accurately measure streamflow nationwide.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Questions were raised as to whether CalFed should have to pay the entire cost. While costs are high the benefits for use on other Central Valley streams may well justify it. The actual funding requested from CalFed needs to be clarified.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   This was rated high by the San Joaquin regional review. They stated that the river is a highly mobile sand bed river and the need for improved methods is critical.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   Reviewer was unable to determine amount of funds requested from CalFed. The Applicant must verify proposal amount based on federal or state fund source. It was unclear who owns the land where the building would occur, but local permits may be required for cable and power lines, etc. Applicant should consult with CDF&G to determine if a 1601 a required.

Miscellaneous comments:

None

San Joaquin Regional Review:

Proposal Number: 238

Applicant Organization: US Geological Survey

Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

The SJR is basically a highly mobile sand bed river, Even below the dam the armored cobble contains extensive sands. Accurate streamflow measurement is a critical element to enhancing water management flexibility; consequently, the need for improved methods in the SJV basin is high.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Certainly the field aspects are feasible. A site downstream has been selected to help ensure security of the facilities.

   From a technical standpoint, many USGS special expertise can be brought to bear on the project.

   Construction of a necessary cableway is required, but feasible. Proponant needs to ensure permitting requirements with CDFG and the ACOE for the cableway are satisfied.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   This project pertains to SJR Priority No. 6 to conduct adaptive management experiments in regard to natural and modified flow regimes to promote ecosystem functions or otherwise support restoration activities.

   Although the proposal only discusses the applicability of the project to VAMP, it would have wide applicability to the rest of the SJR, most of which also has an unstable sand bed from reach 1b to the mouth of the Merced River. It would also apply to any similar stretches of the tributaries. The benefits of improved measurements would range from helping manage restoration and fish flows, but also flood management programs.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   Being coordinated with national USFWS efforts to develop non-contact flow measurement systems. This project appears to be piggy-backing on that effort from a technical perspective to provide such sampling on a realt ime basis. The acutal radar system approach has already been tested at other US locations and on the Delta-Mendota Canal.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   No local landowner involvement is planned directly, But the project involves a wide variety of USGS personnel, but also will coordinate with all the VAMP managers, who represent all the water districts associated with the SJR upstream of Vernalis It also is partnered with the DWR and will coordinate with the Bureau of Reclamation..

Other Comments:

Restoration on the San Joaquin River, and likely other CALFED areas, depends upon the ability to maximize and improve water management. This is difficult without having available the best and most accurate methods of measuring different parameters necessary for such innovative water management. This is one aspect, similar to the need to be able to better predict snow-melt and runoff, that is essential to the long term success of restoration activities.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

I work for the USGS in a different discipline and location. I do not know the authors and have no financial interest in the proposed work.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**The work proposed is ambitious and important. By developing a reliable and accurate method for meauring streamflow in alluvial channels, the project could better inform water management in the state of California where water is a most valuable resource. The technology could also be used in alluvial chanels in other locations in the United States where accurate and timely information on streamflow could enhance public safety, water allocation, and environmental management. The proposal is clearly written and outlines a series of tasks that are logical and feasible. The team is well-qualified to undertake the project and the probability of a positive outcome is high.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The basic goals of this work are to refine radar-based streamflow measurement techniques and ultimately build and operate a non-contact stream flow measurement system that will be used to collect stream flow data during 2002 and 2003. During 2003 the plan is to use the system to provide near-real time flow measurements. The goals of the project are clearly

stated and the proposal provides a logical explanation of the process that will be used to achieve the study goals. The primary hypothesis is that the radar-based system will be useful for providing more accurate and timely measurements of stream flow than conventional stream gaging methods. A second hypothesis is that surface measures of velocity can be accurately related to mean column velocity. The overall concept of the study is both timely and important. Water allocation and conservation issues are going to continue to grow in importance. The ability to provide accurate estimates of streamflow in an alluvial channel in near-real time will facilitate better water management and ultimately benefit both water users and the environment.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   This study is justified based on the value of the water resource and the cost of the proposed research. The proposal does a thorough job of explaining why conventional stream gaging methods and other options for measuring flow are not suitable for accurate and efficient measurement of flow in rivers with unstable channels like at the Vernalis site. The project describes a flow of work that progresses in stages from development to implementation. The work seeks to adapt and refine existing technologies to address a clear need.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach is logical. The proposal clearly shows how the work will progress in steps that build on one another and culminate in a new technical capability. The steps outlined are well defined and appropriate for accomplishing the objectives of the work. The product of the study will be a new capability for measuring streamflow in alluvial channels. This capability has great importance in providing accurate and timely information on stream flow. Accurate measurement of stream flow in alluvial channels will help inform important decisions regarding water allocation, flood safety, and environmental consequences of flow management. The technology devloped would be valuable for many rivers throughout the United States.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The study approach is documented thoroughly in the proposal. The proposed work builds on previous studies using similar technologies in manual operation. Based on the demonstrated success of earlier work in radar-based flow measurement and mapping as well as the established focus of the proposal authors, the probability of success is high. The scale of the project is consistent with the proposed objectives. The proposed work is for one geographic site. This will simplify logistics and allow the research team to concentrate on system development.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The specific measure of performance for this project will be improved availability of accurate streamflow measurements at the Vernails site for 2002 and 2003. The proposed work plan calls for development, installation, and manual operation of the flow measurement system in

2002 and near-real time operation during 2003. The proposed work includes a schedule for constructing, testing, and operating the system which provides milestones for judging progress. Ultimately, the success of the project will be determined by the extent to which accurate and reliable measurements of streamflow are made with the proposed system.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   One product from this study would be the streamflow data collected during 2002 and 2003 at the Vernalis site. These data would be valuable for accurately assessing the effects of changes in streamflow on numerous physical and environmental variables. The more significant product would be the advancement in capability for accurately measuring streamflow in alluvial channels. The value of this technological capability would be very significant for the state and beyond.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The applicants have demonstrated their capability and the possibilities of the technology in previous studies. The team has a national reputation and is composed of a diverse group of specialists. Their previous work has facilitated relationships with contractors, universities, and industry that will allow the work to proceed in a timely manner. They are rather uniquely qualified to undertake this type of study.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The proposed budget for the project is just under 1 million dollars. The total cost is proposed to be shared by four (or five) partners with the applicants' agency contributing over one third of the total amount. Based on the scope of what is prooposed, the amount of technology application and development required, and the real costs outlined in the proposal, the budget seems reasonable. The potential benefit both locally, in terms of accurate measurements (see example on p17 of the proposal) and nationally, interms of the advancement of capability, is large.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

I am an employee of the submitting institution, the U.S. Geological Survey. I work in a different Division than the project proponents.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**This project has the potential to significantly advance the ability to accurately measure streamflow. The proposal is well organized and thorough. The project team has direct experience developing radar measurement systems. The proposed experiments appear to be well designed, and the project team has the right expertise and technical support to carry them out.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Yes, the objective and the hypothesis to be tested are clearly stated. The goal of the project is to refine a radar-based streamflow measurment technique by testing it at Venalis. The radar system has the potential to improve accuracy of streamflow measurements, particularly in channels where the bed is unstable. Accurate flow gauging is critical to the management of the estuary.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Yes, the study is justified relative to existing knowledge. The project proponents have tested radar systems in several river environments. The more extensive deployments proposed here are a logical extension of previous work. Vernalis is a good study site because of its importance to water management in the estuary, and because the channel is unstable, as shown in the proposal.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Yes. The project will contribute to the development of a new method for measuring streamflow. If this sytem proves reliable, it will be extremely useful to decision makers. Regardless of the performance of the radar, the streamflow measurements taken in this study will be useful to the VAMP studies. The approach is well thought out; two radar systems will be tested, and extensive verification measurements are planned.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The approach is very well documented. The project is ambitious, but the likelihood of success is high, because of the composition of the project team. The feasibility issues in using radar to measure streamflow (relating surface velocities to depth averaged velocities and automation of the system) are clearly discussed in the proposal. One of the goals of the research is to investigate these issues.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Yes. System verification is a significant portion of the project, so the performance of the radar system will be straightforward to evaluate. The project also proposes to provide detailed streamflow measurements to the 2002 and 2003 VAMP projects, and VAMP participants can assess whether this goal is met.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Yes. The evaluation and refinement of the radar system, as well as the detailed measurements made during the VAMP studies will be valuable. Since the results will be submitted for peer-review publication, they will be readily available.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

The project team is highly qualified to carry out this project. They have experience developing and testing radar-based stream gaging systems, as well as extensive expertise in hydrological research. Within the USGS they have the technical support and field staff necessary to validate the radar system.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Yes.

Miscellaneous comments:

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

The authors work for the USGS. I also work for this organization. Although I have met two of the researchers before, we do not work in the same office, nor have we ever worked on a project together.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**This is a well written proposal. The question for Calfed funding is whether the new technology could actually work on the San Joaquin and whether it would be cost-effective.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Goals are clearly stated. The authors will test the feasibility of using radar-based systems to improve flow measurements. The project will also test if surface velocities can be used to predict mean-flow velocities.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

The justification is clearly defined. The problem of accurate discharge estimates from channels with very mobile beds is of concern in many river systems. Figure 1 illustrates the magnitude of this problem in the San Joaquin River near Vernalis. Because water is such an important, expensive commodity, accurate estimates for the volume of water on realistic time scale are very much needed. Accurate flow measurements support several ERP priorities.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach is straightforward: install new technology and test it against standard stream gaging methods. Conventionally acquired flow, depth and velocity data will be collected through the year to compare with the values collected by the radar system. Extensive measurements will allow for valid comparison of the techniques.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The feasibility of collecting the necessary data is high. The USGS is well placed to install and operate the necessary equipment. What is not stated is how the feasibility of running this type of station over the long-term will be addressed. If radar is found to be an acceptable technology, would it also be affordable in terms of both money and personnel time?

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Performance standards and measures were implied rather than directly stated. I assume standard USGS stream gaging techniques will be used, and that the standard quality control analysis, which is well developed by the USGS, will be applied to the measurements.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The results will be relayed to interested parties. Even a negative result (i.e, that the radar-based technology does not work well) is useful information, not only for Calfed sites but form many rivers with highly mobile beds.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The staff involved have a long history of stream gaging expertise and are highly qualified to conduct this study.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

Because radar technology has broader application than just the Vernalis site, it seems that Calfed shouldn't have to pick up the entir4e tab for this study. The high cost of the radar system should be considered. For example, is Task 3 "System Operation" really costs $46,000 a year, it may be more cost-effective to have a hydrologic technique make more frequent manual measurements at a much lower cost and not even use the new technology.

Miscellaneous comments:

External Scientific: #4

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

I worked with Delta flows for the last 15 years prior to my retirement; Vernalis flows were an integral part of that work. I have had several conversations during the past several years with two of the proposal PIs regarding the problems of monitoring flows at Vernalis.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**I think the proposed work is very important. The cost may appear to be quite large for monitoring the flow at one location, but the work will have far reaching effects for monitoring many alluvial streams across the country, including several in the CALFED domain in addition to Vernalis (i.e. other San Joaquin River sites south of Vernalis, Feather River, and many in southern California).**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals and objectives are clearly stated, including the uncertainties that can prevent the stated goals from being met. I am concerned about the timeline goals however. The project is geared toward the 2002 VAMP flow which is generally from April 15 through May 15. This 30-day constant pulse flow is only 2 months away, and it appears that may tasks need to be completed prior to the generation of this flow pulse. For example, has the GPR cableway been purchased and installed; have the CODAR modifications stated on page 12 been made; has AC power been provided to the site? Without these tasks being completed by April, the

proposed goals can't be reached.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Flow monitoring at Vernalis has always been problematic because of the shifting alluvial channel bottom. The question is to what precision do the flows need to be measured at Vernalis? Five to 10% accuracy is probably adequate for many purposes, but probably not others. For instance, Vernalis is a very important flow boundary for most Delta flow and transport models from which data are generated for CALFED decision making; 5% or less flow accuracy would be preferable. The generation of the 30-day VAMP flow requires accurate measurement of flow, or large quantities of water can be wasted, such as occurred in 1997 when low-flow rating shifts were in appropriately applied to the higher pulse-flow period. As the example stated on page 17 shows, even a 1% error in flow rate can amount to quite a costly loss of water. Therefore, because of the importance of the flow data at Vernalis, and the present flow monitoring problems which preclude the collection of high quality data, the proposed work appears to be justified.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The approach to this research effort appears to be well designed. The results generated by the project, whether successful or not, will greatly enhance the knowledge base for those attempting to monitor flows in alluvial channels.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The Hydro 21 group has demonstrated that the proposed approach is feasible at other locations across the country, but only in a manual mode. Developing the system into a continuous automated operating system may be very difficult and time consuming. I'd be interested to hear how the GPR will be maintained at 2-3 ft. above the water surface in the automated system. I guess only time will tell how feasible that part of the proposal will be. My main concern is will the system be able to measure low- flow conditions at Vernalis, which are very important flows to monitor, or will wind effects on the water surface and elevated water conductivities precluded accurate measurement?

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Collection of numerous "conventional flow measurements" are scheduled to be made for use in calibration and verification of the proposed system. I'm assuming that the conventional current-meter measurements (or ADCP measurements) will be made from a boat at the proposed new site 1,200 feet downstream from the current flow monitoring site and measurement bridge. Measuring conditions at the bridge are not the best due to bridge piers, scour holes, and flow angles. I assume conventional depth soundings will be made with sounding weights in addition to fathometer and ADCP traverses to determine GPR accuracy.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Reports and presentations are planned to provide project results to CALFED and other interested parties.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The PIs are very capable individuals with many years of experience in the collection of hydrodynamic data, and with experience with the GPR and radar systems proposed for use in this project. The supporting staff is also adequately qualified to execute this project.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The cost appears to be quite large considering it only is dealing with one flow site, but the solution to the problem is not an easy one, and requires very sophisticated and expensive equipment. CALFED is only being asked to provide 44% of the total cost. Since the proposal is directed toward the USBR VAMP project, I was surprized that no USBR funding was shown in the project funding table on page 17. DWR's MWQI group recently received funding from CALFED to install a water-quality monitoring site at the site proposed by this project. That should result in cost savings for installation of power and telephone lines, and possibly instrument shelter costs. As mentioned previously, the answer to the question of what accuracy of flow data are required at Vernalis is needed to adequately define the cost/benefit ratio.

Miscellaneous comments:

The proposal is generally well written, but there are a few items that I didn't understand or would like to have had more explanation. Such as, I don't know what is meant by "improve public safety during the VAMP" on page 15, or radars "could be used in conjunction with UVMs and ADCPs to make those technologies more robust for applications on shifting alluvial channels" on page 6. What is the extent of the river surface area that is being monitored to determine the surface velocity? Are the GPR system results effected by wind conditions that could cause the system to tilt and not be perpendicular to the river bottom?

It was not clear to me who would have ownership of the purchased equipment and software upon completion of the proposal. If the automated system is successful during the 2003 VAMP, will the equipment remain in place and be used to provide the flow record for Vernalis forever after, or would CALFED or someone else need to provide funding to purchase and install new equipment?

External Scientific: #5

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Monitoring river discharges during high flow conditions is very problematic and prone to high error using conventional methods. If reservoir release schedules for driving fluvial processes along river corridors in concert with natural precipitation events is to ever b come the operational norm then some more timely methods must be developed. This approach seems like a leap forward worth the risk. Previous experience by the investigators in manual use of radar for streamflow measurement provides a solid foundation. Detailed data sets for cross section and velocity distribution will be used to compare radar based streamflow estimates with conventional methods as ground truthing.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Objective is to refine existing radar-based stream-flow techniques to ultimately operate these systems in continuous near-time mode t the Vernalis gage. Major hypotheses to be tested are that radar-based flow-measurement system can be used to provide accurate flow data in timely and more frequently than conventional methods, and that radar-based surface-velocities are readily correlated with and can be used to predict mean-flow velocities.

This would be an important innovation and a real time saver.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   This involves research to extend manual use of radar or flow measurements and if successful would greatly improve stream gaging during high flow conditions.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   This project should generate novel information for use in river flow measurements techniques applicable nationwide. It is well designed, In addition to the developmental efforts extensive flow velocity and channel geometry measurements would be taken to test the hypotheses.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Previous manual work with radar-based flow measurement techniques make this entirely feasible. Likely success for automating the radar-based flow measurement technique is high. The use of ground penetrating radar for cross section measurement during flood stage is truly a research effort. Even if shown to not be feasible the effort would enhance the scientific understanding of radar base techniques.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Little discussion of performance measure other than data distribution and published data comparisons between conventional and radar-based measurements

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Products will include conventional stream gaging records as well as the radar-base data or comparison. As typical for USGS gage data it will be supplied to CalFed decision-makers and reported in scientific literature.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Investigators are quite capable of carrying out this research. The USGS infrastructure and support assure that this project will be effectively implemented.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   None

Miscellaneous comments:

None

External Scientific: #6

Research and Restoration External Scientific Review Form

Proposal Number: **238**

Applicant Organization: **US Geological Survey**

Proposal Title: **Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**While the proposal itself is well-written and the study team is strong, I feel the justification for this project is pretty weak at the present time. Future implementation may be warranted once the technological risks are reduced.**
XGood	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   While the goal, objectives and hypotheses are clearly stated and understandable, I disagree with the Investigators that simply by measuring flow more frequently, the accuracy of such flow data will be enhanced, especially when unproven technology and assumptions are being applied. I feel this project would be more timely and important from the CALFED perspective once the technology has been proven and is ready for implementation.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

I could not find a clearly recognizable "Justification" section within the proposal. On p. 15 however, I did find several attempts to relate this effort to the CALFED ERP...Goals...Plan, so I will respond to those statements. The Investigators argue that conventional flow records at Vernalis are rated to be within 10 percent of the actual flows only 95 percent of the time. To justify their proposal, they claim they will reduce such uncertainty. I would argue that given the unknowns regarding their project (e.g. surface velocity-mean velocity relations, real-time application, conductivity effects), such claims may not be warranted. Furthermore, it strikes me as odd that such a high-priced, unproven system would be implemented to reduce hydrologic uncertainty by perhaps a percentage point or two, when the uncertainty associated with the aquatic ecosystem and its response to flows is likely in the range of 95 percent of reality, 10 percent of the time. I believe this project is appropriately classified as research. However, I would be more supportive of it were it ready to move to the implementation stage.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The research approach outlined appears to be quite logical and adequate to meet the objectives of the study. Once the research has been conducted and the technology validated, then I would suggest that CALFED implementation may be warranted. Ultimately I believe this technology for stream gaging may have somewhat more universal application, but at present it appears there are some risks involved.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   While the scale of the proposed project may be consistent with the objectives, I question the technical feasibility and likelihood of success at this point in time.As noted above, several substantive problems need to be overcome for success to be realized and a near real-time radar system developed.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The performance measures and anticipated products appear adequate for the research described.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   In the longer term, once the radar system has been proven reliable and effective, I feel the implementation of such a system may be of value to the CALFED Program. Until such time, I would question the potential benefits.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

The team of scientists assembled to conduct this research are well qualified to address the goals and objectives of the study. The necessary infrastructure and support systems are in place to accomplish the project.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   As I've attempted to explain above, I question the benefits of the proposed research in relation to the costs required from the perspective of the CALFED Program. Stationing a team of hydrographers at the Vernalis gage station to take additional measurements during critical flow periods would likely be more cost effective in the short term. Once the radar technology is proven, then its application may be warranted.

Miscellaneous comments:

None.

Prior Performance/Next Phase Funding:

New Proposal Number: 238

New Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   USEPA Grant/IAG# DW 14955500/RW14955461

   Real Time Monitoring

   DWQP

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   XYes -No -N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes -No -N/A

   If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

XYes **-**No **-**N/A

If no, please explain:

Other Comments:

Project handled by USEPA Region 9 Bruce Macler

Environmental Compliance:

Proposal Number: 238

Applicant Organization: US Geological Survey

Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Due to federal funding, the applicant should consult with USFWS to determine if NEPA compliance is required. It was unclear as to who owns this land or where exactly the building was to occur, but local permits may be required for cable and power lines and building the shed. If it is to occur on the bank, the applicant should consult with CDFG to determine if a 1601 is required.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   -Yes **X**No

   If no, please explain:

   If permits are needed, money and time were not allocated for that task.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 238

Applicant Organization: US Geological Survey

Proposal Title: Improving streamflow information for the San Joaquin River at Vernalis, California, using radar-based streamflow measurement techniques.

1. Does the proposal include a detailed budget for each year of requested support?

   XYes **-**No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes **-**No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes **-**No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   -Yes **X**No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

   Applicant must verify proposal amount absed upon federal or state fund source. Amounts requested by fund source are inconsistent through out document.

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

If no, please explain:

7. Are there other budget issues that warrant consideration?

XYes **-**No

If yes, please explain:

Unable to determine amount of funds requested from CALFED.

Other Comments: